PA NT COOPERATION TREAT

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 12 February 2001 (12.02.01)	
International application No. PCT/IT00/00261	**Applicant's or agent's file reference** 46639
International filing date (day/month/year) 26 June 2000 (26.06.00)	**Priority date** (day/month/year) 02 July 1999 (02.07.99)
Applicant CANOVA, Antonio et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

27 December 2000 (27.12.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
46639		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/IT 00/ 00261	26/06/2000	02/07/1999
Applicant		
MAGNETEK S.P.A. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

Inter[illegible]lication No
PCT/IT 00/00261

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H02P7/62 H02P7/622 G05F1/455 G05F1/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H02P G05F H02M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 347 474 A (BROOKS ET AL.) 31 August 1982 (1982-08-31) abstract column 3, line 17 -column 5, line 64; figures 1,2 ---	1,7,14
A	US 5 283 726 A (WILKERSON) 1 February 1994 (1994-02-01) abstract column 4, line 9 -column 5, line 16 column 6, line 16 -column 14, line 30 column 26, line 35 -column 28, line 52; figures 1-4,16 --- -/--	1-5, 7-11,14, 16-19

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 November 2000	08/11/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Beitner, M

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter[illegible]ication No
PCT/IT 00/00261

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 444 359 A (RIGGIO) 22 August 1995 (1995-08-22) column 3, line 25-49 column 4, line 55 -column 7, line 56 column 11, line 27 -column 12, line 8; figures 1,2	1,7,14
A	CH 679 704 A (CONTROLUX AG) 31 March 1992 (1992-03-31) abstract column 2, line 54 -column 5, line 16; figures 1,2	1
A	US 4 647 837 A (STEMMLER) 3 March 1987 (1987-03-03) abstract column 2, line 58 -column 3, line 30 column 4, line 18 -column 7, line 60; figures 1-4	1-3

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter[illegible]ication No
PCT/IT 00/00261

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4347474 A	31-08-1982	NONE	
US 5283726 A	01-02-1994	NONE	
US 5444359 A	22-08-1995	AU 4384893 A	24-01-1994
		BR 9306592 A	08-12-1998
		CA 2137365 A	06-01-1994
		CN 1081545 A	02-02-1994
		MX 9303833 A	31-01-1994
		WO 9400807 A	06-01-1994
CH 679704 A	31-03-1992	AU 6433590 A	28-04-1991
		CA 2042589 A	05-04-1991
		WO 9105401 A	18-04-1991
		EP 0452431 A	23-10-1991
US 4647837 A	03-03-1987	AT 35489 T	15-07-1988
		AU 575589 B	04-08-1988
		AU 3352084 A	18-04-1985
		CA 1230643 A	22-12-1987
		DE 3472509 D	04-08-1988
		EP 0144556 A	19-06-1985
		IN 161960 A	05-03-1988
		JP 60098830 A	01-06-1985

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
46639		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IT00/00261	26/06/2000	02/07/1999
International Patent Classification (IPC) or national classification and IPC H02P7/62		
Applicant MAGNETEK S.P.A. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27/12/2000	16.10.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Hascher, T Telephone No. +49 89 2399 2690

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IT00/00261

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-8	as originally filed				

Claims, No.:

1-16	as received on	27/06/2001	with letter of	27/06/2001	

Drawings, sheets:

1/11-11/11	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Reference is made to the following documents:

D1: US-A-4 347 474 (BROOKS ET AL.) 31 August 1982 (1982-08-31)

Reasoned statement under Article 35(2) PCT with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Document D1 discloses (see the abstract, figures 1, 2, 6 and the description: column 3, line 17 - column 5, line 64 and column 7, line 58 - column 8, line 33) a method for supplying an electric motor with a controlled voltage and a circuit for controlling the power supply voltage V0 of an electric motor.
This known circuit comprises means 600, 602, 606 for measuring a difference between a mains voltage Vin and a reference voltage DC and means for generating an alternating correction voltage REF whose frequency is equal to the frequency of the mains voltage Vin and which is phase-shifted with respect to said mains voltage Vin.

The circuit according to claim 1 differs from the known one (D1) in that the phase shift between the mains voltage and the correction voltage is proportional to the difference between the mains voltage and the reference voltage, and said correction voltage is added to the mains voltage.

According to D1, the phase shift between the mains voltage and the correction voltage has a predetermined value (O° or 180°). It would not appear obvious from the teaching of D1 or from any other prior art document cited in the search report to provide a phase shift between the mains voltage and the correction voltage having a value proportional to the difference between the mains voltage and the reference voltage and to add said correction voltage to the mains voltage as stated in claims 1 and 7.
The problem solved by these distinguishing features is to provide the motor with a stabilized voltage despite voltage variations of the mains voltage.

Thus, the subject-matter of claims 1 and 9 appears new and inventive in the light of the available prior art documents.

The subject-matter of dependent claims 2-8 and 10-16 which refer to preferred embodiments also appears new and inventive.

Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

Certain observations on the international application

In figure 2, the voltage V2 is the input signal of block 21. This appears in contradiction with the description: see page 6, lines 32-33.

CLAIMS

1. Circuit for controlling the power supply voltage of an electric motor, characterized in that it comprises means for measuring a difference between a mains voltage (V1) and a reference voltage (Vp), and means (11-14, 17) for generating an alternating correction voltage (V2) whose frequency is equal to the frequency of the mains voltage (V1) and which is phase-shifted with respect to said mains voltage (V1), the phase shift between the mains voltage and the correction voltage being proportional to the difference between the mains voltage and the reference voltage, and said correction voltage (V2) being added to the mains voltage (V1).

2. Circuit according to Claim 1, characterized in that said means for generating said correction voltage comprise a full bridge consisting of four controlled switches (11, 12, 13, 14) whose switching generates the correction voltage (V2), said correction voltage being a square-wave voltage, and a control logic (17) for causing the switching of said controlled switches (11, 12, 13, 14), a virtually continuous voltage source being located in one direct-current branch (18) of said full bridge.

3. Circuit according to Claim 1 or 2, characterized in that it comprises a storage device (19) for storing reactive energy of the motor supplied by said circuit, said storage device (19) supplying energy to the means for generating the correction voltage (V2).

4. Circuit according to Claim 2 and 3, characterized in that said storage device comprises a capacitor located in the direct-current branch (18) of the full bridge.

5. Circuit according to Claim 2 at least, characterized in that said control logic comprises means (21) for generating a signal (B, C) indicating the phase of the mains voltage (V1), means for comparing a signal proportional to the mains voltage (V1) with a reference value (Vp) and for generating an error signal (Verr), comparator means (29, 33) for generating a signal (F, G) which is phase-shifted with respect to said mains voltage (V1) by an amount proportional to said error signal (Verr), and means (33) for obtaining, from said phase-shifted signal, a signal (H; I) for switching the controlled switches.

6. Circuit according to Claim 5, characterized in that said control logic comprises a zero-crossing detector (21) which generates a signal in phase with the mains voltage (V1), a pair of ramp generators (23, 27) to whose inputs is applied the signal generated by the zero-crossing detector (21) and an inverted signal, a pair of comparators (29, 31), to a

first input of which is applied the output signal of the two ramp generators (23, 27) and to a second input of which is applied an error voltage (Verr) proportional to the difference between the mains voltage (V1) and the reference voltage (Vp), and a flip-flop (33) to whose set and reset inputs are applied the output signals of said two comparators (29, 31), the output of said flip-flop being used for switching said controlled switches.

7. Electric motor (3) comprising means of power supply at a controlled voltage (Vm), characterized in that said power supply means comprise means for detecting a difference between a mains voltage (V1) and a reference voltage (Vp), and means (11-14, 17) for generating an alternating correction voltage (V2), whose frequency is equal to the frequency of the mains voltage (V1) and is phase-shifted with respect to said mains voltage (V1), the phase shift between the mains voltage and the correction voltage being proportional to the difference between the mains voltage and the reference voltage, and the correction voltage (V2) being added to the mains voltage (V1).

8. Electric motor according to Claim 7, characterized in that said means for generating said correction voltage (V2) comprise a full bridge consisting of four controlled switches (11, 12, 13, 14) whose switching generates the correction voltage (V2), said correction voltage being a square-wave voltage, and a control logic (17) for causing the switching of said controlled switches (11, 12, 13, 14), a continuous voltage source being located in one direct-current branch (18) of said full bridge.

9. Electric motor according to Claim 7 or 8, characterized in that said power supply means comprise a storage device (19) for storing reactive energy of the motor, said storage device (19) supplying energy to the means for generating the correction voltage (V2).

10. Electric motor according to Claims 8 and 9, characterized in that said storage device comprises a capacitor located in the direct-current branch (18) of the full bridge.

11. Electric motor according to Claim 8 at least, characterized in that said control logic comprises means (21) for generating a signal (B, C) indicating the phase of the mains voltage (V1), means for comparing a signal proportional to the mains voltage (V1) with a reference value (Vp) and for generating an error signal (Verr), comparator means (29, 33) for generating a signal (F, G) which is phase-shifted with respect to said mains voltage (V1) by an amount proportional to said error signal (Verr), and means (33) for obtaining, from said phase-shifted signal, a signal (H; I) for switching the controlled switches.

12. Electric motor according to Claim 11, characterized in that said control logic comprises a zero-crossing detector (21) which generates a signal in phase with the mains voltage (V1), a pair of ramp generators (23, 27) to whose inputs is applied the signal generated by the zero-crossing detector (21) and an inverted signal, a pair of comparators (29, 31), to a first input of which is applied the output signal of the two ramp generators (23, 27) and to a second input of which is applied an error voltage (Verr) proportional to the difference between the mains voltage (V1) and the reference voltage (Vp), and a flip-flop (33) to whose set and reset inputs are applied the output signals of said two comparators (29, 31), the output of said flip-flop being used for switching said controlled switches.

13. Electric motor according to one or more of Claims 7 to 12, characterized in that it is a single-phase asynchronous motor.

14. Method for supplying an electric motor (3) with a controlled voltage (Vm), characterized by generating a low alternating correction voltage (V2), whose frequency is equal to a supply voltage (V1) and which is phase-shifted with respect to said supply voltage by a value proportional to the difference between the supply voltage (V1) and a reference voltage (Vp).

15. Method according to Claim 14, characterized in that said correction voltage (V2) is generated by means of the inductive energy of the motor (3).

16. Method according to Claim 14 or 15, characterized in that said correction voltage (V2) is a square-wave voltage.

17. Method according to one or more of Claims 14 to 16, characterized by supplying said motor by means of a full bridge of controlled switches (11, 12, 13, 14), by arranging a substantially continuous voltage supply (19) in one direct-current branch (18) of said full bridge, and by modifying the phase of the switching of said switches as a function of said difference between the supply voltage (V1) and the reference voltage (Vp).

18. Method according to Claims 15 and 17, characterized in that said substantially continuous voltage source (19) consists of a capacitor (19) which is charged by means of the inductive energy of said motor.

19. Method according to Claim 17 at least, characterized by: generating a signal (B, C) indicating the phase of the mains voltage (V1); comparing a signal proportional to the mains voltage (V1) with a reference value (Vp) and generating an error signal (Verr) proportional to

the difference between the mains voltage and the reference value; generating a signal (F, G) which is phase-shifted with respect to the mains voltage (V1) by an amount proportional to the error signal (Verr); obtaining a signal (H; I) for switching the controlled switches (11, 12, 13, 14) from said phase-shifted signal.

20. Method according to Claim 19, characterized by: generating a signal (B) detecting the zero-crossing of the mains voltage (V1) and a corresponding inverted signal (C); generating two corresponding ramp signals (D, E); comparing said ramp signals with said error signal (Verr) and generating two comparison signals (F, G); and generating the signal (H; I) for switching the controlled switches (11, 12, 13, 14) from the comparison signals (F, G).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.